Catheter-Associated Urinary Tract Infection (CAUTI) Event

Introduction: The urinary tract is the most common site of healthcare-associated infection, accounting for more than 30% of infections reported by acute care hospitals[1]. Virtually all healthcare-associated urinary tract infections (UTIs) are caused by instrumentation of the urinary tract.

CAUTI can lead to such complications as cystitis, pyelonephritis, gram-negative bacteremia, prostatitis, epididymitis, and orchitis in males and, less commonly, endocarditis, vertebral osteomyelitis, septic arthritis, endophthalmitis, and meningitis in all patients. Complications associated with CAUTI cause discomfort to the patient, prolonged hospital stay, and increased cost and mortality. Each year, more than 13,000 deaths are associated with UTIs.[1]

Prevention of CAUTIs is discussed in the CDC/HICPAC document, *Guideline for Prevention of Catheter-associated Urinary Tract Infections*[2]

Settings: Surveillance will occur in any inpatient locations where denominator data can be collected, which may include critical intensive care units (ICU), specialty care areas (SCA), step down units, and long term care wards. Neonatal ICUs are NOT included. A complete listing of inpatient locations can be found in Chapter 15.

NOTE: It is not required to monitor for CAUTIs after the patient is discharged from the facility. However, if discovered, any CAUTI occurring within 48 hours after discharge should be reported to NHSN. No additional indwelling catheter days are reported.

NOTE: Neonatal ICUs may participate but only off plan (not as a part of their monthly reporting plan).

Requirements: Surveillance for CAUTI is performed in at least one inpatient location in the healthcare institution for at least one calendar month as indicated in the *Patient Safety Monthly Reporting Plan* (CDC 57.106).

Definitions: As for all infections reported to NHSN, infections associated with complications or extensions of infections already present on admission, unless a change in pathogen or symptoms strongly suggests the acquisition of a new infection area not considered healthcare associated. Therefore, infections that become apparent within the first few days of admission must be carefully reviewed to determine whether they should be considered healthcare associated.

Urinary tract infections (UTI) are defined using symptomatic urinary tract infection (SUTI) criteria or Asymptomatic Bacteremic UTI (ABUTI) criteria (Table 1 and Figure

1). Report UTIs that are catheter-associated (i.e. patient had an indwelling urinary catheter at the time of or within 48 hours before onset of the event).

NOTES:

1. There is no minimum period of time that the catheter must be in place in order for the UTI to be considered catheter-associated. EXAMPLE: Patient has a Foley catheter in place on an inpatient unit. It is discontinued, and 4 days later patient meets the criteria for a UTI. This is not reported as a CAUTI because the time since Foley discontinuation exceeds 48 hours.
2. SUTI 1b and 2b and other UTI (OUTI) cannot be catheter-associated.

Location of attribution: The location where the patient was assigned on the date of the UTI event, which is further defined as the date when the first clinical evidence appeared or the date the specimen use to meet the criterion was collected, whichever came first.

EXAMPLE: Patient, who had no clinical signs or symptoms of UTI upon arrival to the Emergency Department, has a Foley catheter inserted there before being admitted to the MICU. Within 24 hours of admission to the MICU, patient meets criteria for UTI. This is reported to the NHSN as a CAUTI for the MICU because the Emergency Department is not an inpatient location and no denominator data are collected there.
EXCEPTION:
Transfer Rule: If a CAUTI develops within 48 hours of transfer from one inpatient location to another in the same facility, or a new facility, the infection is attributed to the transferring location. This is called the Transfer Rule and examples are shown below.

- Patient with a Foley catheter in place in the SICU is transferred to the surgical ward. Thirty six (36) hours later, the patient meets the criteria for UTI. This is reported to NHSN as a CAUTI for the SICU.
- Patient is transferred to the medical ward from the MSICU after having the Foley catheter removed. Within 24 hours, patient meets criteria for a UTI. This is reported to NHSN as a CAUTI for the MSICU.
- Patient with a Foley catheter in place is transferred from the medical ward to the coronary care ICU (CCU). After 4 days in the CCU, the patient meets the criteria for UTI. This is reported to NHSN as a CAUTI for the CCU.
- EXAMPLE: Patient on the urology ward of Hospital A had the Foley catheter removed and is discharged home a few hours later. The ICP from Hospital B calls the next day to report that this patient has been admitted to Hospital B with a UTI. This CAUTI should be reported to NHSN for Hospital A and attributed to the urology ward.

Indwelling catheter: a drainage tube that is inserted into the urinary bladder through the urethra is left in place, and it is connected to a closed collection system, e.g., not used for irrigation also called a Foley catheter, does not include straight in-and-out catheters.

Numerator Data: The *Urinary Tract Infection (UTI*) F*orm* (CDC 57.114) is used to collect and report each CAUTI that is identified during the month selected for surveillance. The *Instructions for Completion of Urinary Tract Infection Form* (Tables of Instructions, Tables 5 and 2a) includes brief instructions for collection and entry of each data element on the form. The UTI form includes patient demographic information and information on whether or not an indwelling urinary catheter was present. Additional data include the specific criteria met for identifying the UTI, whether the patient developed a secondary bloodstream infection, whether the patient died, and the organisms isolated from cultures and their antimicrobial susceptibilities.

REPORTING INSTRUCTIONS:

- If no CAUTIs are identified during the month of surveillance, the Report No Events box must be checked on the appropriate denominator summary screen, e.g., Denominators for Intensive Care Unit (ICU)/other locations (Not NICU or SCA), etc.

Denominator Data: Device days and patient days are used for denominators (See Chapter 16 Key Terms). Indwelling urinary catheter days, which are the number of patients with an indwelling urinary catheter device, are collected daily, at the same time each day, according to the chosen location using the appropriate form (CDC 57.117, and 57.118). When denominator data are available from electronic databases, these sources may be used as long as the counts are not substantially different (+/- 5%) from manually collected counts, validated for a minimum of 3 months. These daily counts are summed and only the total for the month is entered into NHSN. Indwelling urinary catheter days and patient days are collected separately for each of the locations monitored.

Data Analyses: The SIR is calculated by dividing the number of observed infections by the number of expected infections. The number of expected infections, in the context of statistical prediction, is calculated using CAUTI rates from a standard population during a baseline time period as reported in the NHSN Report.

NOTE: The SIR will be calculated only if the number of expected HAIs (numExp) is ≥ 1.

$$\text{SIR} = \frac{\text{Observed (O) HAIs}}{\text{Expected (E) HAIs}}$$

While the CAUTI SIR can be calculated for single locations, the measure also allows you to summarize your data by multiple locations, adjusting for differences in the incidence of infection among the location types. For example, you will be able to obtain one CAUTI SIR adjusting for all locations reported. Similarly, you can obtain one CAUTI SIR for all specialty care areas in your facility.

The CAUTI rate per 1000 urinary catheter days is calculated by dividing the number of CAUTIs by the number of catheter days and multiplying the result by 1000. The Urinary Catheter Utilization Ratio is calculated by dividing the number of urinary catheter days by the number of patient days. These calculations will be performed separately for the different types of ICUs, specialty care areas, and other locations in the institution, except for neonatal locations.

[1]Klevens RM, Edward JR, et al. Estimating health care-associated infections and deaths in U.S. hospitals, 2002. Public Health Reports 2007;122:160-166.

[2]Gould CV, Umscheid CA, Agarwal RK, Kuntz G, Pegues DA. Guideline for prevention of catheter-associated urinary tract infections 2009. Infect Control Hosp Epidemiol. 2010;31(4):319-326.

Table 1: Urinary Tract Infection Criteria

Criterion	Urinary Tract Infection (UTI)
	Symptomatic Urinary Tract Infection (SUTI) Must meet at least 1 of the following criteria
1a	Patient had an indwelling urinary catheter in place at the time of specimen collection or onset of signs or symptoms *and* at least 1 of the following signs or symptoms with no other recognized cause: fever (>38°C), suprapubic tenderness, or costovertebral angle pain or tenderness *and* a positive urine culture of $\geq 10^5$ colony-forming units (CFU)/ml with no more than 2 species of microorganisms (see Comments section below). ----------OR---------- Patient had indwelling urinary catheter removed within the 48 hours prior to specimen collection or onset of signs or symptoms *and* at least 1 of the following signs or symptoms with no other recognized cause: fever (>38°C), urgency, frequency, dysuria, suprapubic tenderness, or costovertebral angle pain or tenderness *and* a positive urine culture of $\geq 10^5$ colony-forming units (CFU)/ml with no more than 2 species of microorganisms(see Comments section below). .
1b	Patient did not have an indwelling urinary catheter in place at the time of, or within 48 hours prior to, specimen collection or onset of signs or symptoms *and* has at least 1 of the following signs or symptoms with no other recognized cause: fever (>38°C) in a patient that is ≤65 years of age, urgency, frequency, dysuria, suprapubic tenderness, or costovertebral angle pain or tenderness *and* a positive urine culture of $\geq 10^5$ CFU/ml with no more than 2 species of microorganisms(see Comments section below).
2a	Patient had an indwelling urinary catheter in place at the time of specimen collection or onset of signs or symptoms *and* at least 1 of the following signs or symptoms with no other recognized cause: fever (>38°C), suprapubic tenderness, or costovertebral angle pain or tenderness *and* at least 1 of the following findings: a. positive dipstick for leukocyte esterase and/or nitrite b. pyuria (urine specimen with ≥10 white blood cells [WBC]/mm^3 of unspun urine or ≥3 WBC/high power field of spun urine) c. microorganisms seen on Gram stain of unspun urine

Criterion	Urinary Tract Infection (UTI)
	and a positive urine culture of $\geq 10^3$ and $<10^5$ CFU/ml with no more than 2 species of microorganisms(see Comments section below). ----------OR---------- Patient had indwelling urinary catheter removed within the 48 hours prior to specimen collection or onset of signs or symptoms *and* at least 1 of the following signs or symptoms with no other recognized cause: fever (>38°C), urgency, frequency, dysuria, suprapubic tenderness, or costovertebral angle pain or tenderness *and* at least 1 of the following findings: a. positive dipstick for leukocyte esterase and/or nitrite b. pyuria (urine specimen with ≥ 10 white blood cells [WBC]/mm^3 of unspun urine or ≥3 WBC/high power field of spun urine) c. microorganisms seen on Gram stain of unspun urine *and* a positive urine culture of $\geq 10^3$ and $<10^5$ CFU/ml with no more than 2 species of microorganisms(see Comments section below).
2b	Patient did not have an indwelling urinary catheter in place at the time of, or within 48 hours prior to, specimen collection or onset of signs or symptoms *and* has at least 1 of the following signs or symptoms with no other recognized cause: fever (>38°C) in a patient that is ≤65 years of age, urgency, frequency, dysuria, suprapubic tenderness, or costovertebral angle pain or tenderness *and* at least 1 of the following findings: a. positive dipstick for leukocyte esterase and/or nitriteb. pyuria (urine specimen with ≥10 WBC/mm^3 of unspun urine or ≥3 WBC/high power field of spun urine) c. microorganisms seen on Gram stain of unspun urine *and* a positive urine culture of $\geq 10^3$ and $<10^5$ CFU/ml with no more than 2 species of microorganisms(see Comments section below).
3	Patient ≤1 year of age with* or without an indwelling urinary catheter has at least 1 of the following signs or symptoms with no other recognized cause: fever (>38°C core), hypothermia (<36°C core), apnea, bradycardia, dysuria, lethargy, or vomiting *and* a positive urine culture of $\geq 10^5$ CFU/ml with no more than 2 species of

Criterion	Urinary Tract Infection (UTI)
	microorganisms(see Comments section below). . *The indwelling urinary catheter was in place within 48 hours prior to specimen collection or onset of signs or symptoms.
4	Patient ≤1 year of age with* or without an indwelling urinary catheter has at least 1 of the following signs or symptoms with no other recognized cause: fever (>38°C core), hypothermia (<36°C core), apnea, bradycardia, dysuria, lethargy, or vomiting *and* at least one of the following findings: b. positive dipstick for leukocyte esterase and/or nitrite pyuria (urine specimen with ≥10 WBC/mm^3 of unspun urine or ≥3 WBC/high power field of spun urine) c. microorganisms seen on Gram's stain of unspun urine *and* a positive urine culture of between ≥10^3 and <10^5 CFU/ml with no more than two species of microorganisms(see Comments section below). . *The indwelling urinary catheter was in place within 48 hours prior to specimen collection or onset of signs or symptoms.
Criterion	**Asymptomatic Bacteremic Urinary Tract Infection (ABUTI)**
	Patient with* or without an indwelling urinary catheter has no signs or symptoms (i.e., for any age patient, no fever (>38°C), urgency, frequency, dysuria, suprapubic tenderness, or costovertebral angle pain or tenderness, OR for a patient ≤1 year of age, no fever (>38°C core), hypothermia (<36°C core), apnea, bradycardia, dysuria, lethargy, or vomiting) *and* a positive urine culture of >10^5 CFU/ml with no more than 2 species of uropathogen microorganisms** (see Comments section below). *and* a positive blood culture with at least 1 matching uropathogen microorganism to the urine culture, or at least 2 matching blood cultures drawn on separate occasions if the matching pathogen is a common skin commensal. *The indwelling urinary catheter was in place within 48 hours prior to specimen collection. **Uropathogen microorganisms are: Gram-negative bacilli, *Staphylococcus* spp., yeasts, beta-hemolytic *Streptococcus* spp., *Enterococcus* spp., *G. vaginalis*, *Aerococcus urinae*, and *Corynebacterium* (urease positive)$^+$. $^+$Report *Corynebacterium* (urease positive) as either *Corynebacterium species unspecified (COS*) or as *C. urealyticum* (CORUR) if so speciated.
Comments	• Laboratory cultures reported as "mixed flora" represent at least 2 species of organisms. Therefore an additional organism recovered from the same culture, would represent > 2 species of microorganisms. Such a specimen cannot be used to meet the UTI criteria. • Urinary catheter tips should not be cultured and are not acceptable for the

Criterion	Urinary Tract Infection (UTI)
	diagnosis of a urinary tract infection. • Urine cultures must be obtained using appropriate technique, such as clean catch collection or catheterization. Specimens from indwelling catheters should be aspirated through the disinfected sampling ports. • In infants, urine cultures should be obtained by bladder catheterization or suprapubic aspiration; positive urine cultures from bag specimens are unreliable and should be confirmed by specimens aseptically obtained by catheterization or suprapubic aspiration. • Urine specimens for culture should be processed as soon as possible, preferably within 1 to 2 hours. If urine specimens cannot be processed within 30 minutes of collection, they should be refrigerated, or inoculated into primary isolation medium before transport, or transported in an appropriate urine preservative. Refrigerated specimens should be cultured within 24 hours. • Urine specimen labels should indicate whether or not the patient is symptomatic. • Report secondary bloodstream infection = "Yes" for all cases of Asymptomatic Bacteremic Urinary Tract Infection (ABUTI). • Report only pathogens in both blood and urine specimens for ABUTI. • Report *Corynebacterium* (urease positive) as either *Corynebacterium* species unspecified (COS) or as *C. urealyticum* (CORUR) if so speciated.

Figure 1: Identification and Categorization of SUTI with Indwelling Catheter (see comments section page 7-8 thru 7-9 for important details)

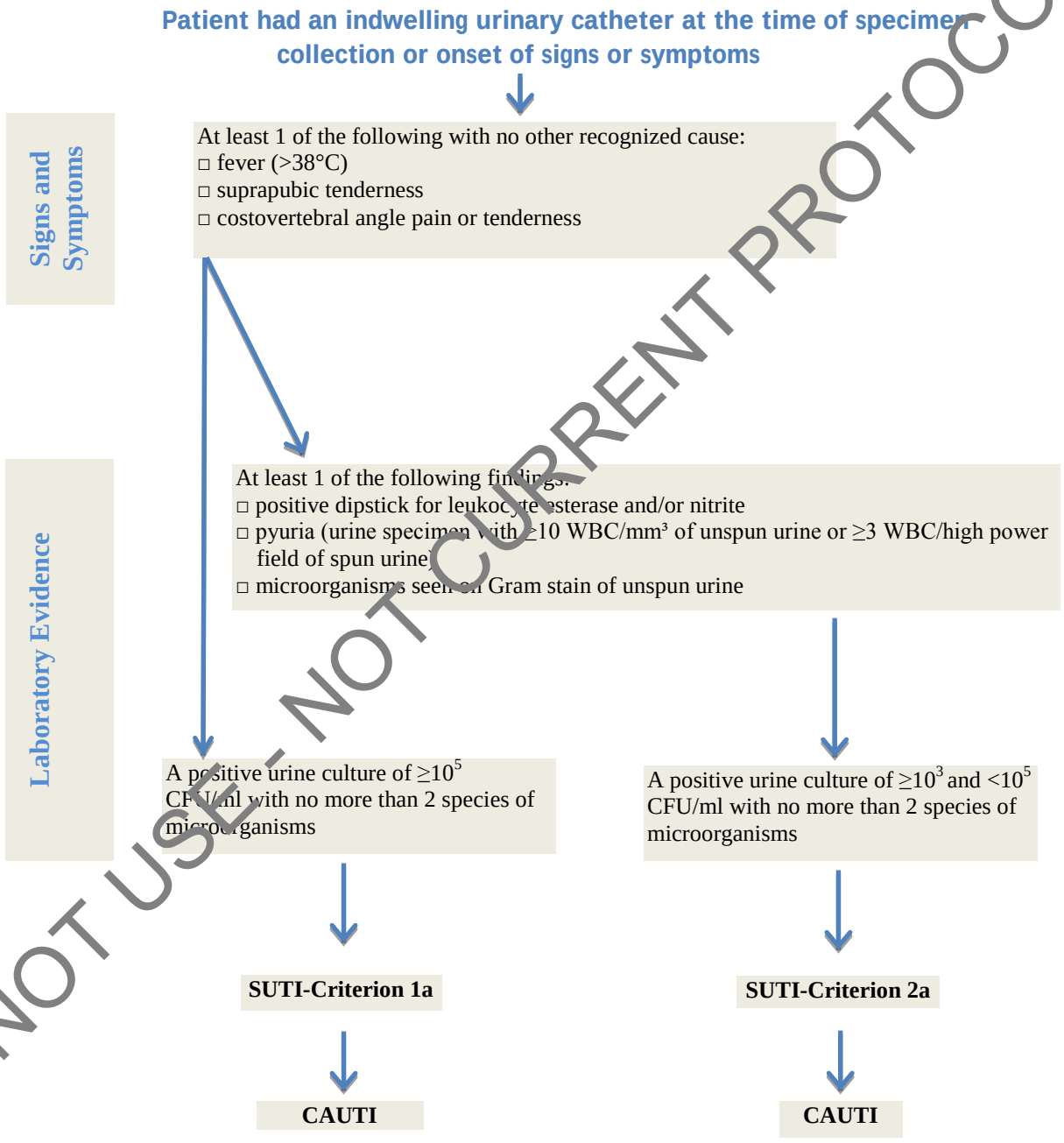


Figure 2: Identification and Categorization of SUTI Indwelling Catheter Discontinued in Prior 48 Hours (see comments section page 7-8 thru 7-9 for important details)

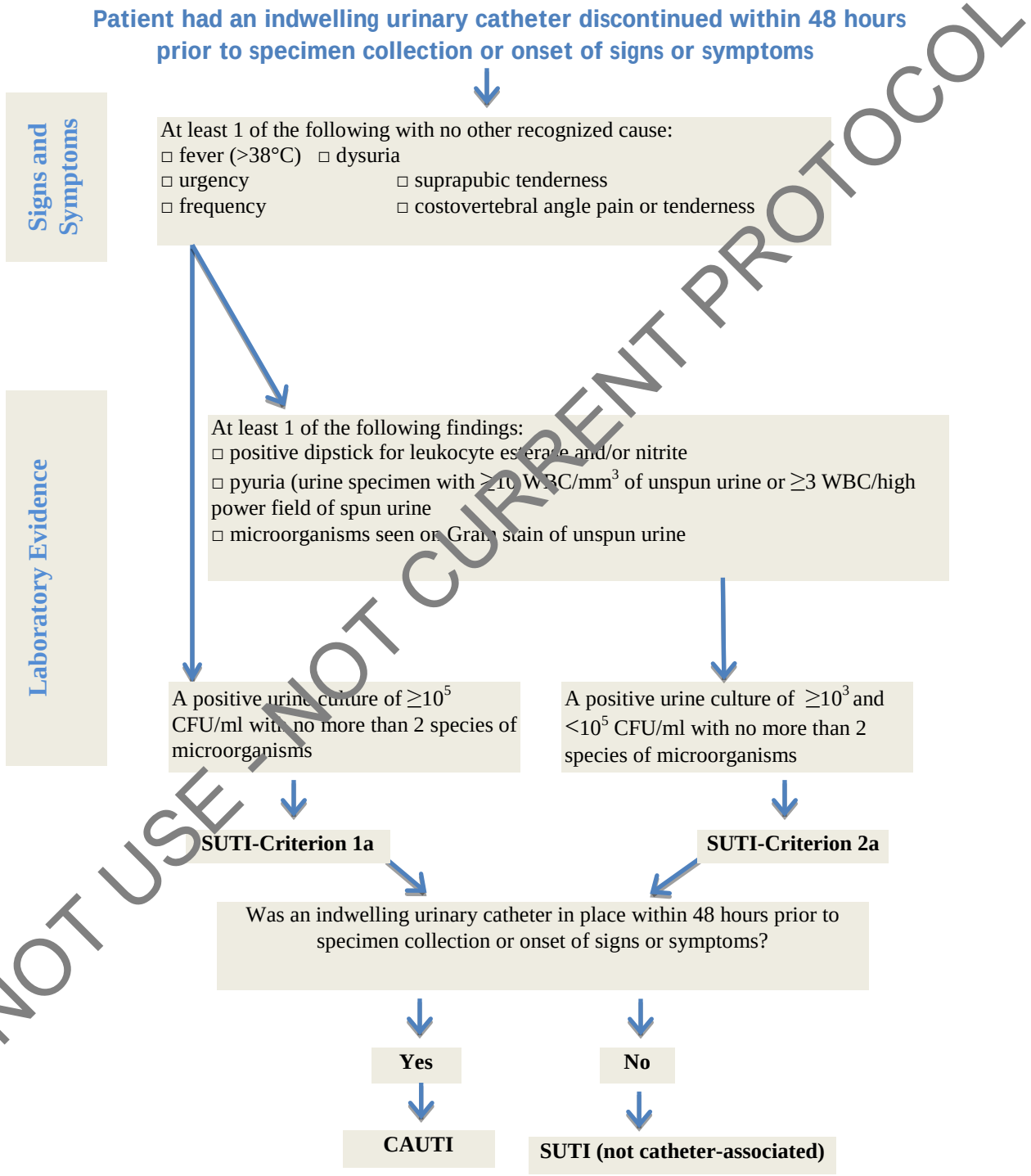


Figure 3: Identification and Categorization of SUTI without Indwelling Catheter (see comments section page 7-8 thru 7-9 for important details)

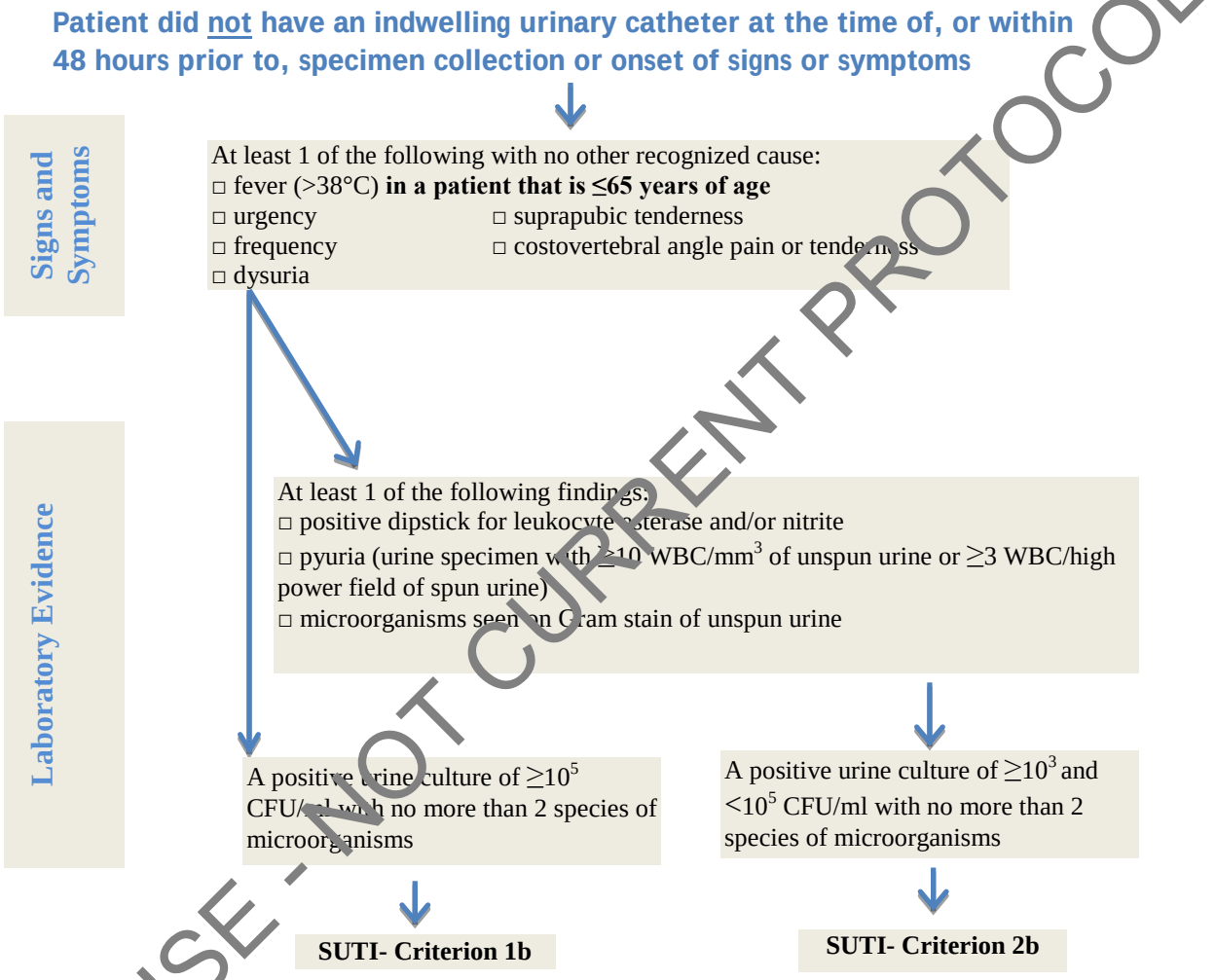
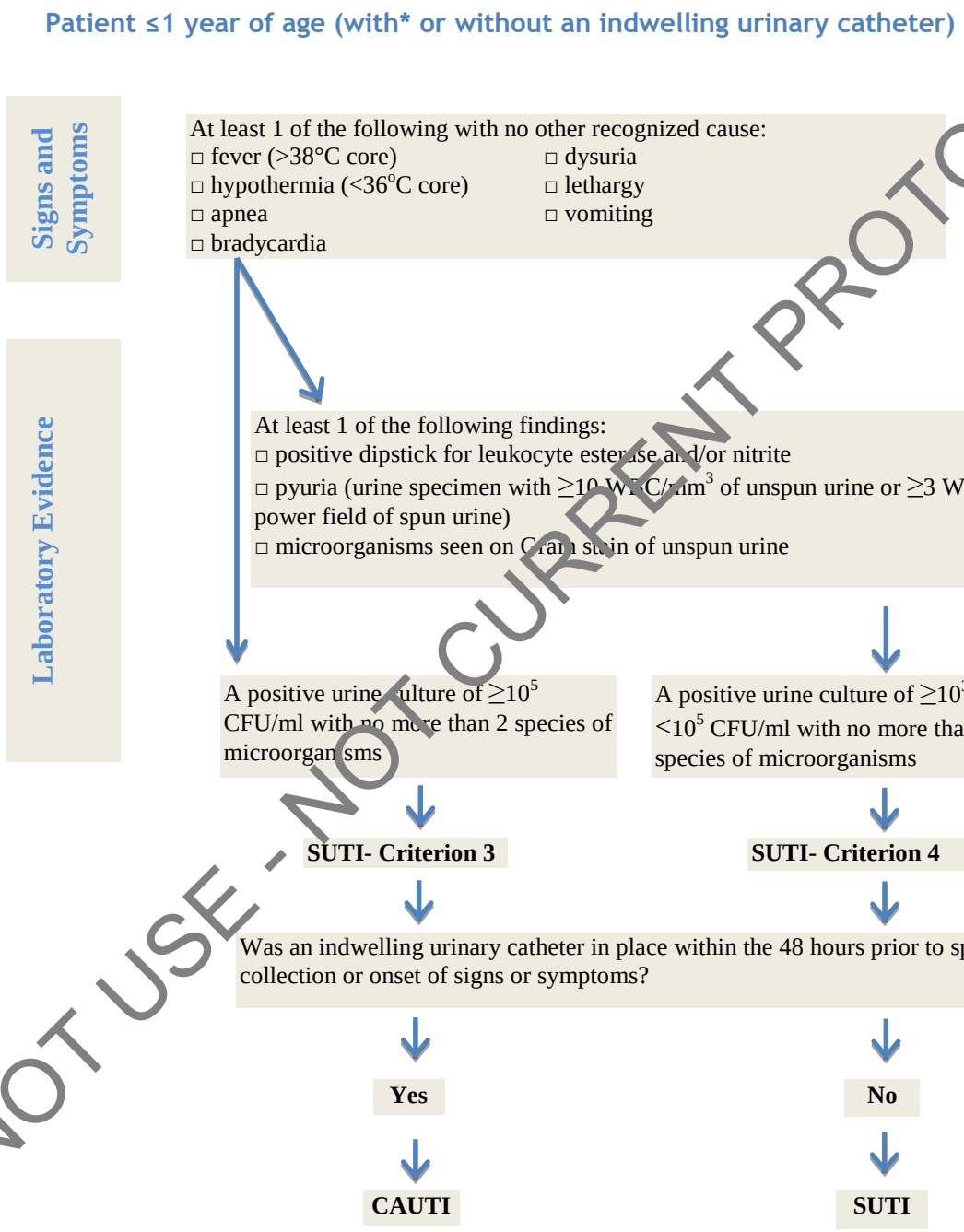
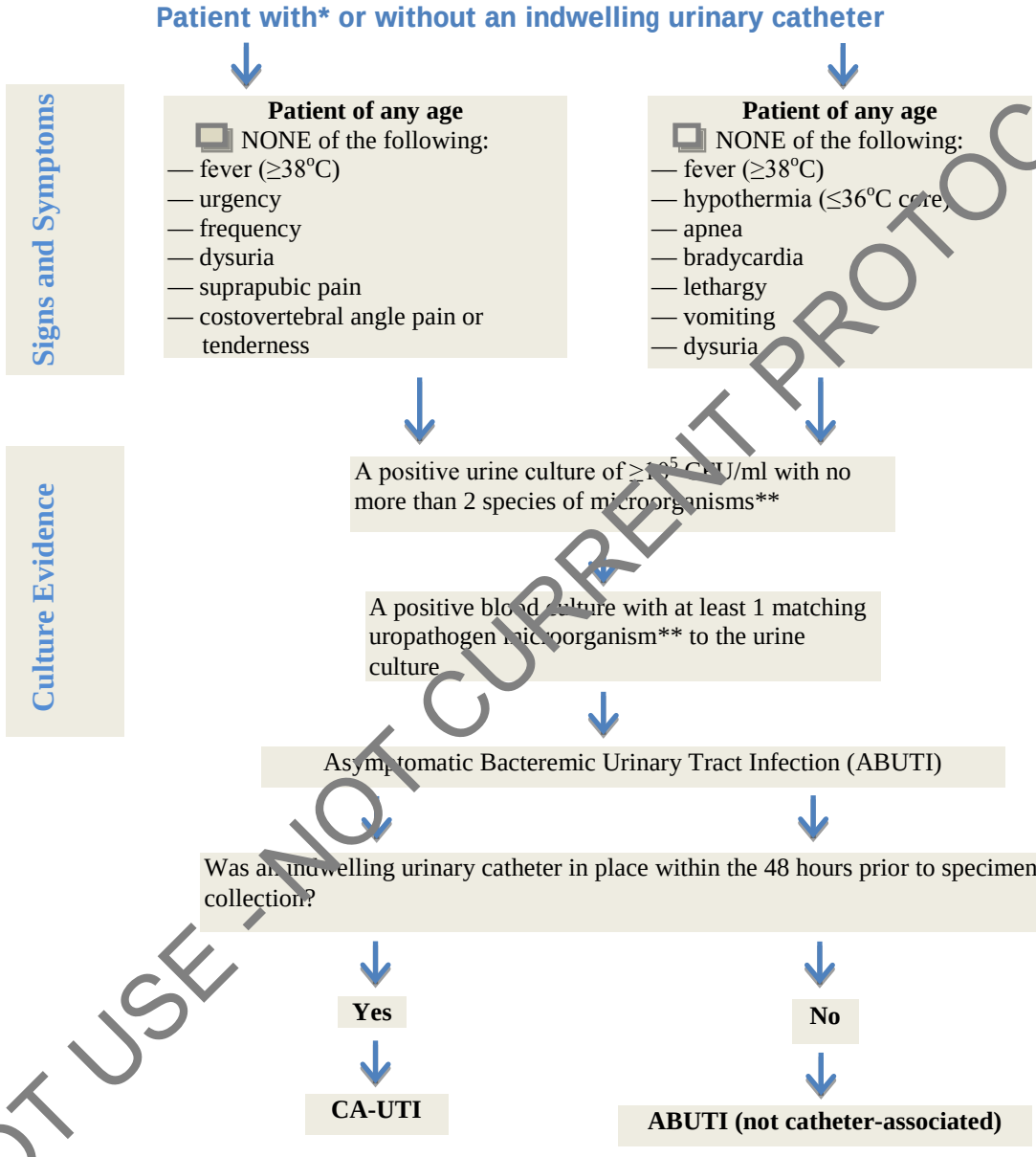


Figure 4: Identification and Categorization of SUTI in Patient ≤1 Year of Age (see comments section page 7-8 thru 7-9 for important details)



*The indwelling urinary catheter was in place within 48 hours prior to specimen collection or onset of signs or symptoms.

Figure 5: Identification of Asymptomatic Bacteremic Urinary Tract Infection (ABUTI)



*The indwelling urinary catheter was in place within 48 hours prior to specimen collection s.

**Uropathogen microorganisms are: Gram-negative bacilli, *Staphylococcus* spp., yeasts, beta-hemolytic *Streptococcus* spp., *Enterococcus* spp., *G. vaginalis*, *Aerococcus urinae*, *Corynebacterium* (urease positive)[†].

[†]Report *Corynebacterium* (urease positive) as either *Corynebacterium species unspecified* (COS) or as C. *urealyticum (CORUR) if so speciated*.